

DISEASE NOTE

FIRST REPORT OF 'CANDIDATUS PHYTOPLASMA SOLANI' IN PEPPER AND CELERY IN BOSNIA AND HERZEGOVINA

D. Delić¹, N. Contaldo², B. Lolić¹, Đ. Moravčević³
and A. Bertaccini²

¹University of Banjaluka, Faculty of Agriculture,
Bosnia and Herzegovina, Bulevar vojvode Petra Bojovića 1A,
78000-Banjaluka, Bosnia and Herzegovina

²Alma Mater Studiorum, University of Bologna, DipSA,
Plant Pathology, Viale Fanin 44, 40127 Bologna, Italy

³University of Belgrade, Faculty of Agriculture,
Nemanjina Street 6, 11080-Belgrade, Serbia

In August 2015, in Bijeljina (Semberija province of Bosnia and Herzegovina) pepper and celery plants were surveyed for phytoplasma infections. During the survey pepper plants (*Capsicum annuum*) of cvs Fortesa, Niška Šipka and Amanda showing stunting and leaf yellowing were observed, while celery plants (*Apium graveolens* L.) variety 'Giant Prague', expressed leaf whitening and stunting; the percentages of symptomatic plants ranged from 20 to 30%, respectively. Leaf samples from symptomatic and asymptomatic plants were tested to verify phytoplasma presence using nested-PCR/RFLP analyses. Results of 16S rDNA RFLP analyses with *TruI* and *tuf* typing using *HpaII* (Langer and Maixner, 2004) indicated the presence of a 'Candidatus Phytoplasma solani'-related strain in all the symptomatic samples tested. There was no variability in the *tuf* gene and only *tuf*-type b was detected. Four symptomatic pepper and two celery samples were selected for further characterization amplifying *vmp1* and *stamp* genes (Fialová *et al.*, 2009; Fabre *et al.*, 2011). The nucleotide sequences of the obtained amplicons were submitted to GenBank (accession Nos. KU340846-51 and KU295501-06 for *vmp1* and *stamp* sequences, respectively). Homology with 'Ca. P. solani' sequences from database was 96-100% for the *vmp1* and 99-100% for the *stamp* gene. Combined RFLP analyses using *TruI* and *Hpy188I* on *stamp* and *RsaI* on *vmp1* genes distinguished four 'Ca. P. solani' lineages indicating the presence of genetic variability among the phytoplasmas studied. This is the first report of 'Ca. P. solani' presence in symptomatic pepper and celery in Bosnia and Herzegovina.

Fabre A., Danet J.L., Foissac X., 2011. The stolbur phytoplasma antigenic membrane protein gene *stamp* is submitted to diversifying positive selection. *Gene* **472**: 37-41.

Fialová R., Válová P., Balakishiyeva G., Danet J.-L., Šafářová D., Foissac X., Navrátil M., 2009. Genetic variability of stolbur phytoplasma in annual crop and wild plant species in South Moravia (Czech Republic). *Journal of Plant Pathology* **91**: 411-416.

Langer M., Maixner M., 2004. Molecular characterisation of grapevine yellows associated phytoplasmas of the stolbur group based on RFLP-analysis of non-ribosomal DNA. *Vitis* **43**: 191-200.

Corresponding author: D. Delić
E-mail: duska.delic@agrofabl.org

Received January 5, 2016
Accepted February 4, 2016

DISEASE NOTE

FIRST REPORT OF POTATO SPINDLE TUBER VIROID IN MONTENEGRO

M. Luigi¹, J. Zindovic², I. Stojanovic² and F. Faggioli¹

¹Consiglio per la ricerca in agricoltura e l'analisi dell'economia
agraria, Centro di Ricerca per la Patologia Vegetale,
Via C.G. Bertero, 22 - 00156 Rome, Italy

²University of Montenegro, Biotechnical Faculty,
Mibajla Lalica 1, 81000 Podgorica, Montenegro

In summer of 2015, asymptomatic samples of *Solanum jasminoides* (eight samples), *Brugmansia* sp. (four samples), *Lycianthes rantonnetii* (three samples) and *Datura* sp. (two samples) were collected in six different municipalities of Montenegro (Bar, Kotor, Pljevlja, Bijelo Polje, Herceg Novi and Ulcinj) and tested for Potato spindle tuber viroid (PSTVd). Total RNA was extracted from leaves using the RNeasy Plant Mini kit (Qiagen, Germany) according to the manufacturer's instructions and amplified by RT-PCR according to the EPPO protocol (OEPP/EPPO, 2004).

Four samples (three samples of *S. jasminoides* and one of *Brugmansia* sp) out of five samples collected in the Kotor municipality were positive for PSTVd. Samples from other municipalities were negative for PSTVd. To confirm these results, leaves of the positive samples were analyzed with a second RT-PCR (Faggioli *et al.*, 2013). The amplified products obtained with both the first and second RT-PCR diagnostic protocols were cloned and sequenced. All the PSTVd clones showed nucleotide sequences identical among themselves (GenBank accession Nos. KU323790-KU323792 for isolates from *S. jasminoides* and KU323793 for an isolate of *Brugmansia* sp.) and to a Croatian isolate of *S. jasminoides* (GenBank accession No. KF418767.1). To our knowledge, this is the first report of PSTVd in Montenegro.

Faggioli F., Costantini E., Di Serio F., Luison D., Luigi M., Navarro B., Silletti M.R., Tomassoli L., Torchetti E., Trisciuzzi N., 2013. Protocollo diagnostico per Potato Spindle Tuber viroid (PSTVd). *Petria* **23**: 181-454.

OEPP / EPPO, 2004. EPPO Standard PM 7 / 33(1) Diagnostic protocol – Potato spindle tuber pospiviroid. *Bulletin OEPP / EPPO Bulletin* **34**: 257-269.

Corresponding author: F. Faggioli
E-mail: francesco.faggioli@entecra.it

Received January 5, 2016
Accepted January 7, 2016